

Homework 2

1. A rectangular gate $5\text{ m} \times 2\text{ m}$ is hinged at its base and inclined at 60° to the horizontal as shown in Figure 1. To keep the gate in a stable position, a counter weight of 5000 kgf is attached at the upper end of the gate as shown in the figure. Find the depth of water at which the gate begins to fall. Neglect the weight of the gate and friction at the hinge and pulley.

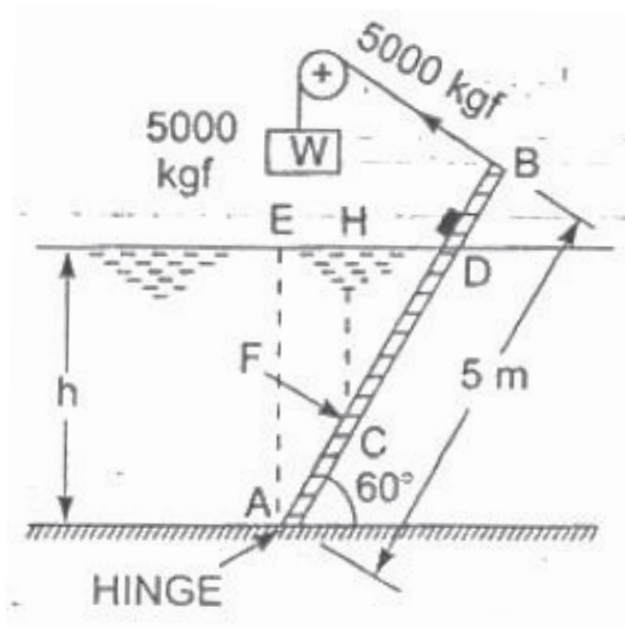


Figure 1

2. Find the horizontal and vertical component of water pressure acting on the face of a quarter gate of 90° sector of radius 4 m as shown in Figure 2. Take width of gate as unity.

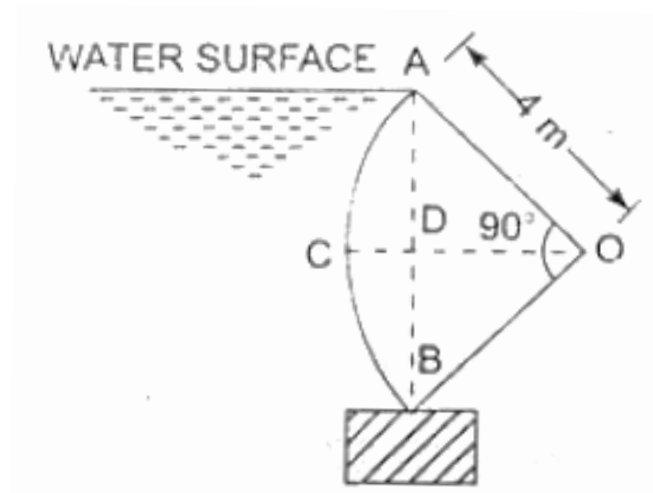


Figure 2

3. A piece of lead ($s = 11.3$) is tied to a 130 cc of cork whose specific gravity is 0.25. They float just submerged in water. What is the weight of the lead, in grams?

4. A concrete dam retaining water is shown in Figure 4. If the specific weight of the concrete is 23.5 kN/m^3 , find the factor of safety against sliding, the factor of safety against overturning, and the pressure intensity on the base. Assume there is a hydrostatic uplift that varies uniformly from full hydrostatic head at the heel of the dam to zero at the toe and that the coefficient of friction between dam and foundation soil is 0.45.

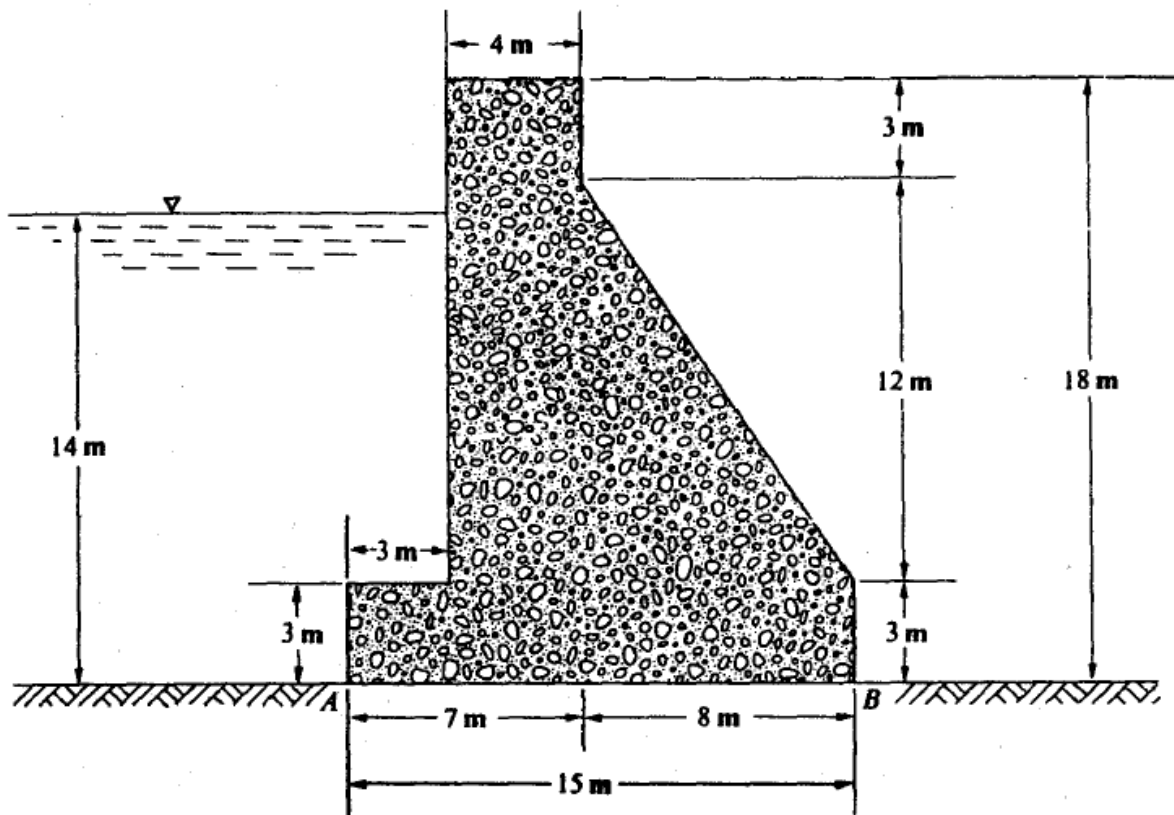


Figure 4